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Satellite Exchange in the Baltimore Needle Exchange Program

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SYNOPSIS

Objective. Our first objective was to develop an index of satellite exchange and then determine whether satellite exchangers (SEs) differed demographically or behaviorally from other injecting drug users (IDUs). Our second objective was to determine the degree that SEs contributed to needle exchange program (NEP) effectiveness.

Methods. We collected data from approximately 5000 Baltimore Needle Exchange Program (BNEP) participants on the number of syringes acquired and returned over the two-year period February 1995 to February 1997. We then conducted one-way ANOVAs and logistic regressions to determine if SEs were different from other IDUs.

Results. We classified 9.35% of the IDUs as SEs and showed that SEs reported levels of drug use and risk behavior similar to other BNEP participants. Although SEs represented less than 10% of all BNEP clients, they accounted for more than 64% of all needles distributed by the BNEP. We showed that SEs accessed more wide-ranging drug use networks than non-SE IDUs and thus can act as potential bridges for human immunodeficiency virus (HIV) prevention materials and messages to larger numbers of drug injectors.

Conclusions. SEs can be expressly targeted with specific prevention messages and encouraged to be "ambassadors" for HIV prevention messages. Efforts to curtail the activities of SEs may detract from the effectiveness of NEPs.

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Needle exchange programs (NEPs) were created to provide clean injecting equipment to injecting drug users (IDUs).¹⁻⁴ NEPs can be effective in preventing the spread of the human immunodeficiency virus (HIV), although this effectiveness varies.⁵ NEPs vary from clandestine efforts operating without legal authorization to more formal programs instituted by governments.^{6,7} The basic philosophy of NEPs is to offer one-for-one exchange of old syringes for sterile replacements. NEPs also often provide education about and materials for safe drug-using habits and referrals to drug treatment.

One phenomenon that has emerged as a result of NEPs are the so-called satellite exchangers (SEs)—individuals who acquire syringes from NEPs or other safe sources and redistribute them to other IDUs. SEs redistribute syringes to other users by selling them, trading them, or giving them away as an altruistic service. SEs provide an extension of NEPs by increasing the service or coverage area served by the NEP. Identifying and measuring the effect of SEs is important since they may extend the efficacy of NEPs.

Needle networks. To understand the role of SEs, we treat the population of drug users in a community as a network of individuals linked together by the sharing of drug-using equipment.⁸⁻¹¹ Thus, aside from the social and economic ties that bind this group together, there is another network based on the transfer of items such as syringes (contemporaneous and serial), cookers, and cotton swabs.¹²⁻¹⁷ This network establishes potential pathways for transmission of blood-borne infections such as HIV and hepatitis B.¹⁸ An individual within this network may be at risk of infection based on the disease status of people to whom he or she is connected and the contamination status of syringes and other shared supplies within the network.¹⁹⁻²¹

NEPs are designed to provide new, sterile syringes within this network and thus reduce the risk of disease transmission. The degree of any NEP's effectiveness is highly dependent on its ability to get syringes into this network. Individuals who exchange syringes at NEPs for their own consumption provide little additional disease protection to others in the network, whereas individuals who distribute sterile syringes to other users provide additional disease protection by substituting sterile links for contaminated ones.

Locating SEs is similar to finding opinion leaders in the diffusion of innovations.²² Opinion leaders are thought

to be influential in the diffusion of innovations since they contribute a disproportionate amount of information and influence to the diffusion process and may have links to many people. In a similar manner, SEs contribute a disproportionate number of needles to the needle network and thus provide an important disease prevention component. Moreover, since SEs may be involved in economic and social transactions proximate to the drug-using event, they are in contact with IDUs at a critical moment to prevent drug equipment sharing.²³⁻²⁸

At the same time, SEs may be at increased risk for infection given that involvement in the needle transaction may also involve them in other transactional processes that increase their risk. For example, having clean needles to contribute to a drug-sharing session may also increase the likelihood that the SE becomes involved in an exchange for sex or drug-using equipment that exposes the SE to disease. Grund and colleagues²⁹ note that syringe-mediated drug sharing among IDUs poses infection risks by a wide variety of sharing mechanisms.

Many drug abuse prevention and HIV prevention projects use outreach workers to get materials and messages into the drug-using network.³⁰⁻³² In contrast, SEs provide a naturalistic or indigenous extension of NEPs into the drug-using network requiring no additional funding and training on the part of the program. The drawback, however, is that SEs do not have the educational and counseling expertise needed to promote safe drug use habits effectively.

Thus, there are both positive and negative features of satellite exchange activity that warrant investigation. This chapter measures the extent of satellite exchange activity in one NEP and estimates the degree to which NEP distribution is channeled through SEs. We first identify SEs.

METHODS

Identifying SEs. Identifying SEs is a relative task that depends largely on each researcher's subjective interpretation. In a strict sense, most NEP users would be considered SEs since they are likely to share their clean syringes with other users in their network. These clean syringes might be given to their friends or lent to those with whom they acquire drugs. The degree of this giving and lending is highly variable and depends on characteristics such as wealth, degree of altruism, and closeness to the person(s) requesting clean needles. Providing others with clean needles may be situation specific, insofar as a user may be inclined to give a needle to a friend one day

but refuse on another for a variety of reasons. This type of casual needle exchanging and distributing could represent an added benefit of NEPs but is not addressed in this chapter. Instead, we are interested in those NEP users who purposely obtain clean syringes at an NEP with the intent of redistributing them for money or for other goods and services.

There are at least two ways to identify SEs: individuals who acquire a large volume of needles irrespective of or relative to their drug use behavior and frequent NEP visitation for the exchange of needles beyond what would be considered normal for a drug user. (SEs also may be defined as individuals who return needles they received from the NEP after those specific syringes have been circulating for a considerable period of time and visit the NEP while the needle is out. This would indicate that this SE got a needle and perhaps sold it to someone who used it and then returned it to the SE some time later, and then the SE returned it to the NEP. This level of identification is possible only when specific needles have been identified and can be traced, as in the present study.) These two mechanisms distinguish between frequent NEP visits and acquisition of many needles, although these variables are highly correlated.

Some IDUs view needle exchanging as an altruistic service they provide to their friends, while others are more actively involved in the social economy of drug use within their user community.^{33,34} We did not ask survey questions to determine whether IDUs thought they were SEs, and, indeed, the idea of satellite exchange is a highly variable and fluid definition depending in part on contextual variables. To identify SEs, we determined which Baltimore Needle Exchange Program (BNEP) participants had (1) a high volume of BNEP syringes acquired or returned, (2) a high frequency of visits to the BNEP during which he or she acquired or returned a large volume of syringes, and (3) a high frequency of visits to the BNEP on consecutive days when he or she acquired or returned a large volume of syringes. These categories are reflected in Table 1.

The first indicator for satellite exchange is acquisition of many needles. The average number of needles acquired among BNEP users during the two-year period was 149 (SD = 448). An SE is a person who acquired more syringes than 95% of the other IDUs, which translates into acquisition of more than 1046 syringes over two years (the average plus two times the standard deviation).

There were 5369 BNEP users who visited the BNEP at least one time during the two-year period from February 1995 to February 1997. Of these, 144

(2.7%) NEP users qualified as SEs by acquiring more than 1046 syringes during the two years. About a third of those syringes returned were program syringes. High volume syringe returners were those who returned more than 425 program syringes during the two years. There were 106 (2.0%) BNEP users who qualified as SEs under this definition. Not surprisingly, most of the IDUs who were high volume returners were also high volume receivers (82% overlap).

We then identified those BNEP users who visited the BNEP frequently to exchange needles by returning old, used syringes in order to restock their supply. It is possible (in fact likely and indeed hoped) that BNEP users who visited the BNEP frequently were simply returning their own and their friends' used needles and getting new, clean syringes. These individuals may provide local exchange and a kind of "runner" service. We would not want to classify these individuals as SEs since, as we mentioned, this localized exchange is not our object of interest. We want instead to identify those individuals who visited the BNEP frequently to restock their supply and were distributing syringes to others not normally served by the BNEP.

During any particular BNEP visit, IDUs acquired, on average, 20 syringes (SD = 23). Thus, obtaining 66 (20 + 2 × 23) or more syringes in one day more than once would be considered obtaining a large volume of program syringes acquired on a daily basis. There were 212 (4%) IDUs who, more than once, acquired 66 or more syringes in any one visit. IDUs returned about eight

Table 1. Number and percent of IDUs who qualified as high volume syringe exchangers under various definitions in the BNEP, February 1995–February 1997

Indicators	Number	Percent
Acquired many needles	144	2.7
Returned many needles	106	2.0
Acquired many needles daily	212	4.0
Returned many needles daily	193	3.6
Acquired many needles on consecutive days	337	6.3
Returned many needles on consecutive days	77	1.4
Number and percent in at least one category	502	9.35

NOTE: Average (SD) = 0.20 (0.78)

(SD = 9.3) program and 12 nonprogram syringes on each visit. Thus, a large volume of syringes returned on a daily basis would be 26 program syringes. There were 193 (3.6%) IDUs who returned 26 or more program syringes in any one visit on more than one occasion.

In this way, we identified 144 IDUs who acquired a number of syringes (more than 1046 during the study), 106 who returned a number of syringes (more than 425 during the study), 212 who returned many on a daily basis (more than 66 on one day more than once), and 193 who returned many program syringes on a daily basis (more than 26 on one day more than once).

Our final strategy to determine high volume exchangers was to identify IDUs who acquired 20 or more syringes on one day and returned the next day to get more syringes. Such rapid turnover in syringes is indicative of distributing syringes for others and not acquiring them solely for personal use. There were 337 (6.3%) IDUs who returned to the BNEP the day after acquiring 20 clean syringes, and 77 (1.4%) IDUs returned to the BNEP the day after returning 20 used program syringes.

These high volume exchangers constituted our pool of SEs. These six classifications were combined to form an index of high volume exchange (Table 1). Note that 9.35% of the IDUs qualified as high volume exchangers under at least one definition, but fewer than 5% met two or more of the criteria.

RESULTS

We have found that roughly 9% of BNEP users can be classified as SEs. In addition to personal consumption, these individuals sell syringes to and sometimes trade syringes with other drug users, providing these IDUs with a source of clean syringes. Of course, it is possible that these high volume exchangers differ from other IDUs in certain ways or consume more drugs and are thus in need of more syringes than other IDUs.

Demographic and drug use associations with SE status. Table 2 shows that SEs were different from other BNEP users in that SEs were older (43 vs. 39.8 years; $P < 0.001$), were more likely to be male (76% vs. 71%; $P < 0.05$), were less likely to be employed (5% vs. 9%; $P < 0.001$), and started injection drug use later (27 vs. 25 years of age). When these demographic characteristics are entered as predictors for being classified as an SE, age is the most significant covariate. In terms of drug use, these SEs were heavier users of speedballing (1.79 vs. 1.65; $P < 0.001$) but not other drugs. When both

demographic and drug use characteristics were regressed on SE status, age remained the most significant covariate, and being male was the only other factor obtaining a significant association (see Table 3).

In the BNEP a subsample of participants recruited into an evaluation study were interviewed every six months. Currently, 787 IDUs have been enrolled in the evaluation subsample and have completed the baseline survey. Of these 787, 92 (11.7%) qualified as SEs. SEs are

Table 2. Comparison of satellite and nonsatellite exchangers on demographic characteristics (N = 5369)

Characteristics	Satellite exchangers (n = 502)	Nonsatellite exchangers (n = 4867)
Age	43.0	39.8 ^a
Male (percent)	76	71 ^b
Employed (percent)	5	9 ^a
Cohabit with sex partner (percent)	27	31
Age at first injection	27	25 ^b
Speedball	1.79	1.65 ^a
Heroin only	1.73	1.77
Cocaine only	1.28	1.22
Speed only	0.05	0.04
Average	1.23	1.18 ^b

^a $P < 0.001$

^b $P < 0.05$

NOTE: Scale for drug use variables: 0 = not in the past six months and 5 = more than five times per day

Table 3. Odds ratios for likelihood of being an SE

Characteristics	Satellite exchangers (n = 502)
Age	1.05 ^a
Male	1.67 ^b
Employed	0.50
Cohabit with sex partner	0.92
Age at first injection	1.01
Speedball injection	1.20
Heroin injection	0.99
Cocaine injection	1.01
Speed use	1.29

^a $P < 0.001$

^b $P < 0.01$

slightly more likely to be in the subsample because their more frequent BNEP visits increased their chances of being selected for the evaluation study.

As in the full sample, SEs were older and more likely to be male compared with other evaluation sample respondents. SEs did not report higher rates of using or injecting drugs and were not significantly different from other evaluation sample respondents in their self-reports of alcohol, sex, or drug risk behavior. In short, SEs report the same kinds of behaviors as other respondents (see Tables 4 and 5).

Reach and effectiveness of satellite exchangers. Now that we have identified SEs, one question suggests itself:

Table 4. Comparison of satellite and nonsatellite exchangers on drug use behavior among evaluation sample respondents—baseline data only

Characteristics	Satellite exchangers (n = 92)	Nonsatellite exchangers (n = 695)
Age	42.1	39.4 ^a
Male (percent)	74	66
Employed (percent)	6	6
Cohabit with sex partner (percent)	23	33
Age at first injection	19.6	21.0 ^b
Drug use average	1.86	1.83
Weekly drug use rate	17.6	15.0
Weekly rate of injection	19.8	16.9

^aP < 0.05

^bP < 0.01

Table 5. Odds ratios for likelihood of being an SE among evaluation subsample

Characteristics	Satellite exchangers (n = 92)
Age	1.06 ^a
Male	0.84
Employed	0.50
Cohabit with sex partner	0.30 ^a
Age at first injection	0.94 ^b
Drug use average	0.67
Weekly drug use rate	1.00
Weekly rate of injection	1.02

^aP < 0.05

^bP < 0.01

How much of the NEP's efforts are channeled through these SEs? We can answer this question by examining the proportion of needles that SEs acquired and the degree to which SEs have contact with other IDUs.

Volume of needle acquisition. Although SEs constitute less than 10% of all BNEP clients, they account for more than 64% of all needles distributed by the BNEP. In fact, those BNEP participants who scored highest on the SE index (a score of six) account for almost 20% of the needles distributed by the BNEP. The most active exchanger acquired 8743 needles from the BNEP during the two-year period. Thus, SEs account for a very large number of the needles distributed.

Network measures. The total BNEP user sample consisted of 5369 IDUs who visited the BNEP between February 1995 and February 1997. Since we bar coded the syringes that were distributed, we can represent the links between these 5369 users as a matrix: each BNEP user represents a row and a column in the matrix, and cell entries represent the number of needles linking the two BNEP users. For example, a "4" in cell [18,24] of the matrix indicates that four syringes were acquired by person 18 and later returned by person 24. This needle transaction network is amenable to network analysis through matrix methods.³⁵⁻⁴⁰

This matrix represents an estimate of the needle transaction network in Baltimore for the time period under study. Currently, our concern is with the position of SEs within this network and whether SEs provide syringes to more IDUs within this network than do other BNEP participants who are not SEs. We computed two scores for the BNEP participants: "outdegree" is the number of people who returned each person's needles, and "indegree" is the number of people for whom each person returned needles.

Of 5369 BNEP participants, 1092 returned only nonprogram needles and so are not included in the network of BNEP needles. Scores for the remaining 4277 IDUs were then compared for SEs and non-SEs. On average, SEs had 65.5 people who returned their needles, while non-SEs had only 7.3 (*P* < 0.001); SEs returned the needles initially acquired by 63.5 people, while non-SEs had only 7.6 (*P* < 0.001). The magnitude of these differences is striking since they indicate that SEs' needle transaction networks are much larger than those of non-SEs. SEs were in contact, through syringe transaction networks, with almost 10 times as many IDUs as regular BNEP users.

DISCUSSION

There are many reasons why identifying and measuring the effect of SEs is important. First, SEs provide a natural extension of NEPs that further their outreach into otherwise underserved groups. It is likely that many IDUs do not want to be identified and thus avoid visiting an NEP because of possible recognition and lack of desire to be identified and to identify with drug use. It also is possible that many IDUs do not use NEPs because they perceive NEPs to be inaccessible or inconvenient, since IDUs often want clean syringes at night and on weekends when they are consuming drugs but many NEPs operate only during the day and during the week.⁴¹ Thus, SEs provide a valuable service by making clean syringes available on a 24-hour, seven-day basis.

Second, SEs are in touch with the drug-using community and can reach it more effectively than the NEP or any "storefront" operation.⁴² Indeed, as Broadhead and colleagues⁴³ noted, using existing drug users to reach a significant portion of an IDU community is often more effective than using outreach workers. Hence, SEs can provide this valuable outreach function.

Third, satellite exchange provides gainful employment for many IDUs. Indeed, many SEs view their exchange activity with a sense of pride in terms of doing a job that is worthwhile (preventing HIV), that provides income (thus reducing the need to steal or beg), and that builds on their unique talents of knowing the drug-using community. By preventing the spread of HIV, SEs save considerable money in health care costs.

SEs offer an indigenous and free-market extension to NEPs not available through other intervention means, and this approach should be capitalized on as NEPs expand. As the debate of Federal and other sources of funding for NEPs intensifies, some may argue that SEs are a liability and should be prevented from making a profit from the sale of clean needles. Given the SEs' level of activity, however, it would seem unwise to curtail their efforts.

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